CLAIMS

1/ A method of photoinducing and reading at least one non-linear optical property in a structure including at least one photosensitive molecular material, in which said structure is irradiated with at least two mutually coherent write light beams to modify the orientation of the molecules of said molecular material, at least one of said beams being suitable for inducing plural-photon absorption in the material;,

characterized in that said structure is an optically confining structure, in that the write beams are parallel to a confinement direction of said structure or oblique relative thereto and distribute the non-linear optical property(ies) over the confining structure in at least one direction perpendicular to said direction in which said structure is confined, and in that one or more "pump" beams is/are caused to propagate in or through said photoinduced structure to generate an optical effect in or through said photoinduced structure from which there results a property in one or more write beams propagating in guided configuration in the photoinduced confining structure.

2/ A method according to claim 1, characterized in that the confining structure is scanned with at least one write light beam, and in that one (or more) parameters of at least one of the write beams is/are controlled as a function of relative displacement between said structure and said scanning beam(s).

3/ A method according to claim 2, characterized in that the writing performed in the irradiated zone by the scanning beam(s) is tested and relative displacement of the confining structure and of the scanning beam(s) is controlled as a function of the result of the test.

4/ A method according to claim 1, characterized in that the write beams are irradiated through a lens and in that one or more parameters of at least one of the write beams is/are controlled.

5/ A method according to claim 1, characterized in that the write beams are irradiated through a mask, and in that one or more parameters of at least one of the write beams is/are controlled.

6/ A method according to claim 1, characterized in that the write beams are irradiated through a holographic structure, and in that one or more of the parameters of at least one of the write beams is/are controlled.

7/ A method according to any one of claims 2 to 7, characterized in that a parameter that is controlled on one or more of the write beams is beam intensity and/or polarization state and/or propagation direction and/or spatial overlap of a plurality of write beams and/or wavelength and/or relative phase between the beams.

8/ A method according to claim 7, characterized in that a parameter is controlled by generating noise on said parameter and by controlling the statistical characteristics of said noise.

9/ A method according to any preceding claim, characterized in that the temperature of the molecular material is controlled.

10/ A method according to claim 9, characterized in that said temperature is controlled by irradiation by means of an additional beam enabling local heating to be performed at the impact point of said write beams.

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11/ A method according to any preceding claim, characterized in that the photoinduction beams write a quasi-phase matching grid for propagating the pump beam(s) and the read beam(s).

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12/ A method according to any preceding claim, characterized in that the molecular material is previously oriented by applying an electric field and/or by heating.

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13/ A method according to any preceding claim, characterized in that the confining structure is a portion of film and/or a ribbon light guide which extends along the propagation direction of the read beam(s) and/or a microcavity in which the read beam(s) propagate(s) in a loop, and/or an optical fiber, and/or a combination of such elements.

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